

(12) **United States Patent**
Kurimoto et al.

(10) **Patent No.:** **US 8,012,964 B2**
(45) **Date of Patent:** **Sep. 6, 2011**

- (54) **9-SUBSTITUTED 8-OXOADENINE COMPOUND**
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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 512 days.

(21) **Appl. No.:** **10/593,691**

(22) **PCT Filed:** **Mar. 24, 2005**

(86) **PCT No.:** **PCT/JP2005/005401**

§ 371 (c)(1),
(2), (4) **Date:** **Dec. 4, 2006**

(87) **PCT Pub. No.:** **WO2005/092893**

PCT Pub. Date: **Oct. 6, 2005**

(65) **Prior Publication Data**

US 2007/0190071 A1 **Aug. 16, 2007**

(30) **Foreign Application Priority Data**

Mar. 26, 2004 (JP) 2004-093672

- (51) **Int. Cl.**
C07D 473/18 (2006.01)
A61K 31/522 (2006.01)
A61P 37/06 (2006.01)
A61P 37/08 (2006.01)
A61P 11/06 (2006.01)
- (52) **U.S. Cl.** **514/234.2; 544/118; 544/276; 544/277**
- (58) **Field of Classification Search** **544/118, 544/276, 277, 234.2; 514/234.2, 263.22, 514/263.23, 263.37, 118**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 4,689,338 A 8/1987 Gerster
4,698,348 A 10/1987 Gerster
4,714,701 A 12/1987 Beauchamp
5,736,549 A 4/1998 Beasley et al.
5,994,361 A 11/1999 Penny et al.
6,028,076 A 2/2000 Hirota et al.
6,110,923 A 8/2000 Ely
6,329,381 B1 12/2001 Kurimoto et al.
6,376,501 B1 4/2002 Isobe et al.
6,458,798 B1 10/2002 Fujita et al.
6,630,478 B2 * 10/2003 Diamond et al. 514/263.3

- 6,951,866 B2 10/2005 Fujita et al.
7,157,465 B2 1/2007 Isobe et al.
7,521,454 B2 4/2009 Isobe et al.
7,642,350 B2 * 1/2010 Pryde 544/61
2002/0040032 A1 * 4/2002 Glasky et al. 514/263.35
2002/0068745 A1 6/2002 Levy et al.
2002/0128264 A1 9/2002 Taylor
2003/0105323 A1 6/2003 Fujita et al.
2003/0144283 A1 7/2003 Coleman et al.
2003/0191086 A1 10/2003 Hamus et al.
2003/0212092 A1 11/2003 Heppner et al.
2004/0019048 A1 1/2004 Crooks et al.
2004/0132748 A1 7/2004 Isobe et al.
2004/0204438 A1 10/2004 Crooks et al.
2004/0229897 A1 11/2004 Crooks et al.
2005/0054590 A1 3/2005 Averett

(Continued)

FOREIGN PATENT DOCUMENTS

CA 1220148 A1 4/1987
(Continued)

OTHER PUBLICATIONS

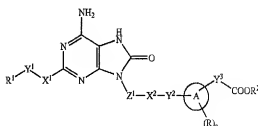
Dvonakova, *Journal of Medicinal Chemistry* (1996), 39(17), 3263-3268.*

(Continued)

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(57) **ABSTRACT**

The present invention provides an 8-oxoadenine compound having immunomodulating activities such as an interferon inducing activity and useful as an antiviral agent and anti-allergic agent, which is represented by the following formula (1):



[wherein the ring A represents a 6-10 membered aromatic carbocyclic ring and the like, R represents a halogen atom, an alkyl group and the like, n represents an integer of 0-2, Z¹ represents alkylene, X² represents oxygen atom, sulfur atom, SO₂, NR², CO, CONR², NR²CO and the like, Y¹, Y² and Y³ represent independently a single bond or an alkylene group, X¹ represents oxygen atom, sulfur atom, NR⁴ (R⁴ is hydrogen atom or an alkyl group) or a single bond, R² represents a substituted or unsubstituted alkyl group, R¹ represents hydrogen atom, hydroxy group, an alkoxy group, an alkoxy carbonyl group or a haloalkyl group] or its pharmaceutically acceptable salt.

4 Claims, No Drawings